New York State Department of Transportation
Office of Engineering

OPERATIONAL PLAN

SFY 1997-98 and Beyond

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TECHNICAL SERVICES DIVISION
OPERATIONAL PLAN FOR SFY 1997-98 AND BEYOND

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TECHNICAL SERVICES DIVISION
OPERATIONAL PLAN FOR SFY 1997-98 AND BEYOND

I. PLAN OF ACTION

INTRODUCTION

The Operational Plan for Technical Services contains and describes the priorities, issues and goals for the program area for SFY 1997-98 and beyond.

The Technical Services program provides materials and geotechnical engineering services and targeted transportation research to the Department through the:

- management and operation of a materials quality assurance program.
- development, recommendation and implementation of engineering policies, standards and specifications.
- conduct of specialized studies requiring investigations, testing and analysis, utilizing both internal and external resources

These services are provided through the Materials, Geotechnical Engineering, and Transportation Research and Development Bureaus in the Central Office in conjunction with the Technical Services, Materials and Geotechnical units in the Regions. The Technical Services program is founded on a multi-million dollar investment in laboratories and equipment in both the Central Office and the Regions and a dedicated, capable staff. There are approximately 260 employees in the Division and almost 300 in the Regional counterparts. In the Regions, the program receives its staffing through the Design and Construction program budgets.

The program serves all elements of the Department as well as some external clients because of the program units' expertise and facilities. The majority of services, now provided, directly support the capital program and this, along with research and development, are the most significant parts of the mission.

The strength of our Division clearly lies within its people. We are a Division of experts in geology, chemistry, pavement design, pavement materials, structural engineering, geosynthetics, materials sciences, foundation engineering, physical testing, decision sciences, quality assurance and many other disciplines.

Our work is comprised of four major activities; Design and Construction support of the capital program, development of engineering and transportation policies, standards and specifications, and training.

Sixty percent of our resources are dedicated to design and construction support. The Division provides the management of a quality assurance program for all the materials incorporated into Department projects. We engage in the direct production of contract plans for geotechnical elements and engineering consultation used as vital input to contract plan development by others in both the Central and Regional Offices. In addition, we provide direct support to projects under construction in the form of consultation to Regional field engineers engaged in both Capital and Maintenance projects.

To any observer of trends in the field of transportation, it is obvious the future will require much more sophistication than the past. The materials, designs, specifications, processes, techniques, and contractual arrangements will all require more sophistication on the part of the Department, its consultants, its contractors and their suppliers.

In the past, the development and continuous improvement of Department products and processes has been supported by 30% of our resources. This activity is vital to the future success of the Department and must be supported in the budget process with appropriate personal and non-personal resources. In the near term, it will be more difficult to allocate resources to these activities, but they must remain a priority for both this Division and the Department.

Finally, sophistication requires training. Training of both the people in this Division and the transfer of technology to others by the people in this Division. To prepare our people to meet the challenges we will face in the future means they must be continuously trained in the present. And they must have the time and resources to train others. Fully 10 percent of our personal service resources and 10 percent of travel funds is spent on training.

The Department's priorities are clear:

- to ensure the safety of the traveling public;
- to preserve and maintain a balanced transportation system;
- to continue the capital construction program to meet critical infrastructure needs and promote economic growth, and
- to maximize program effectiveness

It is equally clear that the mission of this Division directly supports the priority activities of the Department.

However, given the resources we have, we will be challenged to effectively deliver the full range of services as contained in our mission statement.

The capital program is expected to be about $1.4 billion thru SFY 99/2000. To respond fully to such a program size, we would need more than 300 people, yet our target for the end of this fiscal year is little more than 260. However, even as we begin this new year, the Division is below target and TR&DB is seriously below target.

Last year, each Bureau revised its staffing plan to realistically respond to our reduced target levels. These organizational plans are intended to maximize the effectiveness of the Bureaus with the remaining staff. To be effective, these plans must be implemented. Yet to date, we have been able to take only a few of the personnel actions necessary to effect staffing plans. These included four promotions of people to positions in which they had been acting for long periods of time. It is our hope that with passage of the budget this year, we will be given the freedom to put our plans into effect through appropriate promotions and hiring.

Our core production activities center on direct support of the capital design and construction programs. Given the importance and magnitude of these responsibilities, historically, the major fraction of our resources has been dedicated to these efforts. These programs will remain the Division's first priority.

Our second essential mission is to provide for development and continuous improvement of many of the Department's products and processes. The realities of our resource situation poses a direct threat to our ability to provide these services.

The Division has effectively delivered the products necessary to support the capital construction program and will do so again in 1997-98. We will continue to do a limited amount of high priority development work within our available resources. Scarce as these resources are, the work we remain able to do is critical to the success of this Department.

QUALITY SERVICES

The Division takes justifiable pride in its accomplishments; both in terms of its production and continuous improvement achievements.

A sampling of the production activities follows:

Number	Activity
1,259	NYSDOT employees trained by Materials Bureau
1,416	NYSDOT employees trained by the Geotechnical Engineering Bureau
4,676	Transactions by Research Library
10	Research Newsletters
726	Soil Sample Identification Tests
139	Bridge Foundation Designs
439	Evaluations of Materials Plants & Facilities
92	Soil Consolidation Tests
136	Wall Designs
69	Geologic Survey & Analysis of Rock Cut Slopes
150	Materials Project Level Design Consultations
277	General Roadway Inspections
80	Revisions to Geotechnical Specifications & Standards
68	Research Proposals received and rated
104	Materials QA procedures developed/revised
96,408	Materials tests completed on 27,160 samples
10	Research Publications produced
7,180	Geosynthetic tests completed
10,240	Granular Materials Soils tests
37	Roadway Foundation designs
229	Materials Construction Evaluations
123	Soil Strength Tests
413	Topsoil Tests
25	Contract Research Proposals Reviewed and Prioritized
5	Papers Presented at Annual Transportation Research Board Meeting

A sampling of our continuous improvement activities follows:

ABC TV: HIGH PERFORMANCE CONCRETE

Materials Bureau staff and their outstanding accomplishments regarding High Performance Concrete were featured on national television. The ABC Television Network's Nightly News "Solutions" segment presented an overview of NYSDOT's High Performance Concrete currently used for bridge construction in New York.

Don Streeter and Paul St. John of the Bureau's Field Engineering Sections, were interviewed and other Bureau staff were shown performing testing duties in the video taped feature. High performance Concrete uses Fly Ash and microsilica in addition to cement and provides significant improvements in performance due to lower permeability, reduced cracking potential, and easier handling and placing. Bridge decks built with High Performance Concrete are expected to serve 80 years instead of the 40-50 year life of conventional concretes.

Numerous requests for information on New York's High Performance Concrete have been received from other states, public agencies, and the private sector.

APPLYING STATISTICAL METHODS FOR FURTHER IMPROVEMENT OF HIGH-PERFORMANCE CONCRETE FOR BRIDGE DECKS

High Performance Concrete's successful implementation has triggered further research toward an even better mixture. Transportation R&D Bureau and Materials Bureau staff designed and performed an experiment to investigate the effects of cracking and permeability on microsilica and fly ash content, as well as their effects on the total weight of cementitious materials. The experimental design used allowed investigation of a broad range of possible combinations, while testing only a limited number of mixtures. Specific recommendations of promising mixes were made. A second phase of this experiment is planned to verify the desirable properties of recommended mixes.

GEOTEXTILE QUALITY ASSURANCE PROGRAM

Over 140 samples (>4000 specimens) of geotextiles taken from each project on which geotextiles were used were tested for quality assurance during 1996. The program served two functions: 1) It enabled development of a list, of which geotextiles from the Approved List are actually being used in the field. 2) It enabled monitoring the quality of materials in relation to the material properties that were determined at time of approval. The results of the testing, showed that in general reliance can be placed on the quality of the materials received from the manufacturers for our projects. Of the 140 plus samples tested, follow-up was done with the manufacturer to resolve questionable results on six samples.

PRECAST CONCRETE SHOP DRAWINGS

In order to improve the efficiency of the shop drawing review and approval process, Materials Bureau staff developed and implemented shop drawing routing sheets, a precast industry and DOT personnel contact listing, and delegated approval by the regions.

Routing sheets are included with each shop drawing submission. These sheets show the routing sequence the drawings must follow, from initial preparation by the precaster through final approval by the Materials Bureau. Each reviewing group's drawing review responsibilities are included on the routing sheet. The proper use of these sheets should prevent unnecessary delays by clarifying the routing, review and approval requirements for shop drawings under Materials Bureau responsibility.

To improve communications between the Department and the precast industry a list of regional contact personnel, acting as liaisons with the precast industry, was prepared and distributed through the precast association. A similar list of precast industry contact personnel has been prepared and distributed to our regional liaisons. Improved communication during the preparation of shop drawings should result in fewer drawings being returned to the precaster for revision.

To further streamline the review process, the Materials Bureau notified all regions that we will delegate precast shop drawing approval authority to those regions who request it and can demonstrate the ability to do quality drawing reviews. To date, Regions 8 and 4 have requested approval authority. Region 8 is currently delegated to approve box culvert drawings and we are working with Region 4 on delegating approval authority.

ACCEPTANCE CRITERIA FOR CAST IRON ITEMS

With the development of new techniques and equipment, cast iron manufacturers are able to cast their products (frames and covers used in manholes, drainage, and pull boxes) to closer dimensional tolerances, and therefore can reduce wall thicknesses and the weight of their products. Current Departmental Standards for these items were adopted many years ago and no specifications are available for the structural design of these items. Design Division requested Transportation Research and Development Bureau to develop a set of acceptance criteria for new designs. Researchers reviewed available literature, pertinent specifications, and test data of various manufacturers. They also surveyed practices of all other state agencies. Based on the study, a set of criteria were proposed and are being implemented by Design Division. More economical designs of these structures with less material will result in significant savings for the Department.

FOUNDATION DESIGN REPORT STANDARDIZATION

Geotechnical Engineers completed a standardized format document for our structure foundation design reports that are sent to the Structures Division, Regional Structure Designers, or Consultants. This document is a major achievement in many ways.

It ensures that there is uniformity in the way individual Bureau foundation designers present identical recommendations to the structure designer. It serves as a "check list" of design aspects that must be considered to accomplish a thorough analysis. The document includes standard notes which have been gleaned from past reports and carefully edited to clarify misconceptions and confusing wording, resulting in better bids and higher quality construction. Combined with the commentary, the document provides guidelines to the foundation designer regarding the criteria to use for applying specific recommendations. These criteria very closely follow the Standard Specifications and current special specifications for specialty items. The document represents *consensus* between the Structures Division's Foundation and Construction Unit, the Construction Division, and the Geotechnical Engineering Bureau.

SUPERPAVE IMPLEMENTATION

Superpave progressed according to the implementation plan. The Department let eleven Superpave projects in Regions 1-10. Contractors paved over 172,000 metric tons on nine projects in 1996. The federally-aided contracts included a bid item for a gyratory compactor. The contractors used the compactors during construction of the projects and then turned them over to the State. This was an innovative process approved by the Federal Highway Administration to equip Regional Materials Laboratories simultaneously with expensive testing equipment. The Materials Bureau supplied other equipment to fully equip the regional laboratories for Superpave mix design capability.

The plan targets 20 percent Superpave projects in SFY 97-98. The Department let 21 projects with over one million metric tons by the end of SFY 96-97. Over 40 projects, approximately 30 percent of the capital program, will ultimately be let and underway in the 1997 construction season totaling over 2.2 million metric tons.

A Superpave task force continued, consisting of representatives from the Materials Bureau, Regional Materials Engineers, and the hot mix asphalt and aggregate industry. The task force completed an interim version of Materials Method 5.16M, Superpave Hot Mix Asphalt Mixture Design and Mixture Verification Procedures. The Department became an American Association of State Highway and Transportation Officials (AASHTO) Lead State for the implementation of Superpave. Materials Bureau engineers participated in national groups working on the implementation of Superpave.

The Materials Bureau Chemical Laboratory purchased and installed equipment that doubled its capacity to perform quality assurance tests for performance graded binder. The Product Operations group developed quality assurance procedures for the binder.

CONTRACT RESEARCH PROGRAM - TWO PROJECTS COMPLETED

"Cost Effectiveness of Consolidating Government Highway Services"

In response to continuing concerns about the efficient provision of government highway services, the Department has an interest in identifying service functions that are appropriate for consolidation and methods of achieving this consolidation. There is also an interest in identifying institutional barriers that adversely effect decisions based on economic factors. As a result, the project "Cost Effectiveness of Consolidating Government Highway Services" was initiated under the Department's contract research program in July 1995. The Cornell University Local Government Program conducted the research with the Department's Equipment Management Division acting as the client office and consultant manager. A series of case studies of intergovernmental cooperation was developed which document the conclusions that local governments need to develop reliable cost information for the highway services they provide and they also need to develop methods to negotiate cooperative agreements among agencies. This study was completed in October, 1996. The final report summarizes the case studies and recommendations.

"Forward Lighting for Improved Visibility Through Snow"

The safety of the driving public and of its own employees is a major concern to the Department. Visibility for snow plow operators, whose job by its nature is conducted during poor conditions, is of primary importance. Rensselaer Polytechnic Institute's Lighting Research Center undertook this study for the Transportation Maintenance Division to correlate human vision parameters and lighting technology factors to produce a lighting configuration for snow plows which would reduce glare, stress, and fatigue. The study was completed in June 1996. The lighting configuration recommended by this study is being tested in several residencies around the state.

CORROSION INITIATIVE

The Geotechnical Engineering Bureau has undertaken a special project entitled, "Corrosion In The Soil Environment" housed in the Bureau's Specification and Standards Section, to accumulate current knowledge on the subject as it relates to the design and installation of piles, culverts, rock bolts, Mechanically Stabilized Earth Structures (MSE), etc.

The Engineering Geology Section has also been active in the corrosion arena producing two informative reports.

- **Rock Bolt Corrosion Report**

  This report was produced and widely distributed, comparing the strength of corroded bolts recovered from a rock fall to original manufacturer's specifications for the bolts. Recommendations pertaining to the service life-cycle of bolts were made.

- **MSES Resistivity Survey**

  Ten locations (12 walls) were surveyed by two Engineering Geologists to evaluate the feasibility of using field resistivity as an indicator of potential corrosion of the backfilled wall retaining elements. A report was prepared which will be used in a further field investigation involving field resistivity and laboratory resistivity measurements on backfill materials.

QC/QA PROCEDURES FOR HOT MIX ASPHALT

Progress continued in the implementation of the QC/QA specification for hot mix asphalt production. Beginning with the May 23, 1996 letting, all projects let after that date include the specification. Forty-four plants produced over 600,000 metric tons in approximately 530 production days in 1996. The quantity adjustment factor for 1996 was 1.00 for all production unless the contractor opted to produce mix with incentives and disincentives. Three contractors produced under the option and each received a bonus.

The asphalt industry formed an alliance in late 1996 to create a unified industry forum to meet with the Department on hot mix asphalt issues. The alliance includes: The New York State Chapter, AGC; New York State Asphalt Pavement Association; Empire State Concrete and Aggregate Producers Association; Construction Industry Council of Westchester & Hudson Valley; and Long Island Contractors Association. Negotiations with the alliance resulted in revised specifications. The most significant change occurred to the quantity adjustment factor phase-in process.

Regional Materials Engineers met with the Materials Bureau four times to develop procedures and practices for reasonable uniformity between regions. The Materials Bureau and representative Regional Materials Engineers instructed Regional Materials staff on the procedures and practices at four regional seminars.

LIFE-CYCLE ANALYSIS OF CURBING ALTERNATIVES

Concrete curbs have traditionally been favored by design engineers because of their lower initial cost. Granite curbs, on the other hand, are known for their aesthetic value and long, maintenance-free lives. TR&DB researchers conducted a survey of field engineers in the state and collected the data needed for performing reliable life-cycle cost comparisons between the two alternatives. The comparison showed the life-cycle costs for the two curbing materials are very similar. Charts representing decision zones between concrete and granite curbs based on initial costs and contract size have been developed and will be communicated to design engineers.

GUIDELINES FOR SUPPORT SYSTEMS AND EXCAVATION REQUIREMENTS

Soldier pile and lagging walls, cantilever sheeting and other support systems are used extensively on projects incorporating stage construction of structure replacements, culverts, etc. Designers of diverse skill and experience attempt to design these structures, but often fail to properly account for common loading conditions, the geometry of the site, and the details necessary to build the wall and properly bid it.

Geotechnical Engineers have written guidelines that will assist the designer in preparing plans that can be built and bid. Sketches have been developed illustrating a standard example of this type of wall construction, defining pictorially the pay limits, and detailing the application of the appropriate special items. Substantial improvement in the quality of wall designs on future projects will result when these guidelines are issued with the revised specifications.

HEAVY DUTY AND RUT AVOIDANCE HOT MIX ASPHALT

Specification changes were made to Heavy Duty (HD) and Rut Avoidance (RA) Hot Mix Asphalt paving items for the 1997 construction season. Data analysis of past years' HD construction by Bureau engineers demonstrated that the lower density limit should be raised from 91 to 92 percent to insure acceptable HD and RA mixture performance. The new limit is expected to have a minor effect on paving operations but will provide greater assurance that HD and RA pavements will not contain interconnected air voids and lower permeability.

Changes were also made to the RA mixture items to include more controls during the construction of the required test section. The test section is constructed by the contractor to determine a project target density which will be used for the remainder of the project to insure acceptable in-place densities are obtained. Cores are taken from the test section and analyzed by the regional laboratory to determine the project target density. Nuclear density gauges are then used for monitoring the work thereafter.

These specification changes were developed with the input and cooperation of Department Regional staff and asphalt paving industry personnel. Pavements constructed using these performance related specifications will provide longer lasting asphalt concrete for the motoring public.

DEVELOPMENT OF STANDARDS FOR NOISE BARRIERS USING RECYCLED-PLASTIC LUMBER

The Transportation Research and Development Bureau recently proposed standards for noise barriers using recycled plastic. Using recycled plastic to reduce traffic noise is a solution to two increasing environmental problems: plastic waste and noise pollution. An effort was made to present a system addressing the often conflicting issues of cost-effectiveness and aesthetic quality. Cost-effectiveness was assured by selecting an inexpensive form of recycled plastic — plastic lumber — and by optimizing supporting wood and steel systems. Aesthetic attractiveness was advanced by using weathering plastic (available in many colors), and by offering structural frames that can be installed in many configurations. Specifications for recycled plastic-lumber mechanical and physical properties were also addressed, along with structural designs for wall heights from 1.52 m to 7.62 m. Economic investigation had shown cost-competitiveness of the proposed barrier systems with walls made of more conventional materials. Additionally, the proposed systems are more durable, require less maintenance, have a lower life-cycle cost, and provide a wide variety of aesthetic alternatives. Planned future work involves construction, monitoring, and evaluation of a test wall, designed according to the developed standards, over a period in service. Construction of the test wall is expected to start this year at a site in Long Island. Accordingly, unanticipated problems with the proposed standards and specifications in this project will be identified and adequately addressed in future implementation.

GEOTECHNICAL ENGINEERING BUREAU - DESIGN MANUAL

The Geotechnical Engineering Bureau has produced an updated Bureau Design Manual which was distributed to all Regional Geotechnical Engineers. The manual in loose leaf form will be updated yearly to keep it current and complete with respect to presently accepted practices and procedures of geotechnical engineering.

PRECAST CONCRETE BEAM DISTRESS, ROUTE 5 OVER UNION SHIP CANAL

At the request of the Structures Division, Materials Bureau engineers coordinated an extensive evaluation of diagonal cracks occurring at the ends of five year old precast concrete beams. The investigation was to determine if the distress was related to material deficiencies. The project involved the timely training of Region 5 materials staff in the art of inverted coring of structural concrete members, extraction of cores, and the subsequent analysis of the concrete. The coring and analysis were completed in unprecedented time. The following properties of the concrete were investigated: strength, air void system, silica gel reaction and petrographic examination.

It was concluded that the concrete integrity played no part in the distress. The Bureau also provided the Structures Division with technical literature on the retrofit repair of cracked precast concrete beams.

Structural Section Researchers participated in the emergency response team and assisted in the efforts to find solutions to the problem.

DOUBLE-T BEAMS FOR SHORT-SPAN BRIDGES

This study by the Transportation Research and Development Bureau, proposed two alternatives for double-T beams and details for use as substitutes, when appropriate, to voided slabs on bridges in the span range of 7 to 18 m. The first alternative was for bridges with asphalt wearing surfaces (non-composite), and features longitudinal shear keys and transverse post-tensioning at about 1.4m intervals to connect the beams. The second alternative was for bridges with composite concrete decks, and does not require longitudinal shear keys or transverse post-tensioning to connect the beams. The proposed beam sections can be cast using a single casting bed, with flange width from 1.8 to 2.4m for adjustment to fit various bridge widths. This new system is expected to result in 20 to 30 percent material savings when used in lieu of voided slabs.

INCREASED USE OF GEOSYNTHETIC REINFORCED EARTH SLOPES (GRES) TO SOLVE DESIGN AND CONSTRUCTION PROBLEMS.

In the past fiscal year, Geotechnical Engineers standardized the design procedure for GRES and did much to familiarize Regional designers with its advantages and limitations. As a result, the use of GRES has expanded and is expected to expand further, resulting in appreciable monetary savings to the State.

PAVEMENT FRICTION

The Materials Bureau implemented specification changes that limited the use of low acid insoluble residue dolomite on high traffic volume pavements in upstate Regions. The Bureau worked with the Traffic Engineering and Safety Division to develop procedures to address high wet pavement accident locations. One procedure requires pavement friction testing at each site. The Bureau and contracted testing services tested 146 (Bureau 123 and testing services 23) sites. The Bureau also performed testing at 94 pavement inventory sites and 31 Region requested sites.

FULL-DEPTH SHEAR KEY SYSTEM

Bridge decks supported by adjacent precast/prestressed-concrete beams have become increasingly popular in recent years due to their ease of construction, shallow superstructure, and aesthetic appeal. In 1992, full-depth shear keys with more transverse tendons were adopted, prompted by the frequent appearance of longitudinal deck cracking over the partial-depth shear keys soon after construction. A follow up inspection survey was conducted by the Transportation Research and Development Bureau in 1996, at the request of the Structures Design and Construction Division, on 91 such bridges to evaluate their performance. Results indicate that this shear-key system is performing very well and has reduced the frequency of shear-key-related deck cracking. However, there is room for further improvement. Based on experience of other states and the NYSDOT regions, several further improvements are recommended. Structures Design and Construction Division is reviewing these recommendations for implementation.

CROSS WESTCHESTER EXPRESSWAY BRIDGES

The foundations for two viaduct structures were designed on this project, one structure being seven spans in length and the other nine spans in length. Both structures cross old river valleys filled with variable alluvial soil deposits and depth to rock ranging from the surface to over 100 feet deep.

Further complicating the project was the need to design the foundation for two separate superstructure designs with significantly different dead loads and seismic responses. There was also the desire by the Federal Highway Administration and others to incorporate different foundation types for alternate bidding purposes; designs for both driven pile foundations and drilled shaft foundations were prepared. Greater complexity was added through the decision to design one superstructure alternate within the Structures Division, and the second alternate by a consultant and their subconsultants.

The project was recently let and the design efforts will soon come together as a tangible product during construction.

MOISTURE CURE URETHANE PAINT SYSTEM

Materials Bureau General Engineering staff developed specifications for a new coating system for painting structural steel. The new system provides equal performance at equal cost of the standard epoxy/epoxy/urethane system yet provides additional benefits. The new system will replace the current system and is a single component system which is easier to apply. It dries by reacting with moisture in the atmosphere, allows a quicker recoat time, can be applied at lower temperatures, and in conditions of high humidity and wet weather.

A new painting policy and specification is ready for implementation. The new specifications are based on partial removal using power tools, partial removal using abrasive blasting, and total paint removal. An EI implementing the change will soon be available for review by the Regions.

HITEC PARTICIPATION

HITEC, a service center of the Civil Engineering Research Foundation of ASCE, formed a technical evaluation panel to evaluate a new innovative product - ICE BAN. ICE BAN is a liquid anti/de-icing agent that is the concentrated liquid residue of the fermentation and distillation of alcohols (ethanol), and the processing of other agricultural products. It is effective in melting snow and ice faster, and at low temperatures, than sodium chloride. ICE BAN is biologically and environmentally inert, non-corrosive, and has no adverse effects on the roads, infrastructure, and vehicles. It is water soluble, easy to handle, and can be utilized with salts and abrasives. ICE BAN provides the first economical and abundant replacement for chloride salt deicers.

Makbul Hossain of TR&DB has been invited to serve as a member in the evaluation panel. The main objectives of the panel meeting are:

1. Determining the evaluation plan for the ICE BAN product,
2. Performance issues and evaluation approach.
3. Evaluation implementation and schedule.

A Draft Evaluation Plan for ICE BAN - Field Trials Portion has been distributed to the panel members to review. Field testing and final report are underway.

ADIRONDACK PARK AGENCY (APA) AWARDS

Engineering Geologists received awards from the APA for rock slope work within Adirondack Park. One Engineering Geologist received an award for design of the modified presplit rock slope procedure and 3 Engineering Geologists received awards for construction of the slopes.

GEOLOGY SECTION PROCEDURES MANUAL

Engineering Geologists produced a Geology Section procedures manual for uniform treatment of each of the Section's four units' activities. The responsibility of this Section in providing the Structures Foundation Section with rock parameters for rock socket design was also formalized.

ROUTE 9A PCC PAVEMENT PROBLEMS

At the request of Region 11 Materials Engineer Frank Lipinski, Bill Cuerdon and Mike Brinkman of the Materials Bureau, Field Engineering 1 section conducted an on-site evaluation to determine the cause of pavement cracking on the Route 9A, Segment 4 contract. Their investigation identified transverse joint deformed bars as the cause of cracking. Smooth bars are required to permit the independent movement of the concrete slab and transverse joint dowels to accommodate thermal expansion and contraction of the concrete pavement. A detailed report, completed six days after the site visit, documented the cause and provided recommendations for repair.

Additionally, Bill Cuerdon was a member of the Construction Division's independent review team for cracked PCC pavement on this contract.

The Route 9A investigation identified, beyond the deformed dowel issue, several urban paving complications, such as: utility isolation, joint layout complications with utilities, and intersection isolation and joint layout complications. To maximize the long term performance of the 9A pavement, unique jointing details were developed working with Julian Bendaña of TR&DB. Training was provided to consultant designers and construction staff to identify the technical development rationale to assure the proper use of the recommended joint layout details. The lessons learned from the Route 9A project will be reflected in new urban pavement design details.

PAVEMENT DESIGN SUPPORT

Geotechnical Engineering Bureau's Pavement Design Services group has developed spreadsheets to simplify the analysis of Falling Weight Deflectometer data to calculate the subgrade resilient modulus, the effective modulus of subgrade reaction and concrete elastic modulus. This activity was conducted with support from the Transportation Research and Development Bureau personnel to support development of the Overlay Thickness Design Manual and to provide input to general pavement projects.

LABORATORY INFORMATION MANAGEMENT SYSTEM (LIMS)

The Materials Information Systems Group developed and implemented new LIMS applications for performance grade binders, bituminous and concrete core testing, reinforcing bars, fly ash, and traffic paints. The applications, which automate repetitive tasks and provide faster response times to Bureau clients, allow for direct input of all test results, and grant access to sample status, and product approval status. They also eliminate the time intensive task of filing paper test reports as all data is stored only in an electronic format. LIMS also automatically generates letters which transmit test result information to clients resulting in significant savings in time and keyboarding. Windows based applications, developed for Bureau staff, give easy access to test results and sample information through flexible query functions

.GEOGRAPHIC INFORMATION SYSTEM (GIS) IMPLEMENTATION

Engineering Geologists' field activities are being inventoried on the GIS database. Rock slope locations, rock falls, remediations such as catchment fences, buttresses and rock bolts are being plotted, which together with digital video on the same database provides extremely quick access to all relevant information at any location in the database.

AUTOMATION PURCHASE AND INVENTORY

Geotechnical Engineers developed database programs to allow the Geotechnical Engineering Bureau's administration to accurately and quickly track the status of all Purchase Order Money and all Travel Money. The programs also provide progress checks for each requisition/purchase order and each traveler's individual account. The program entry forms are easy to use and result in understandable reports.

LOCAL AREA NETWORK

The Geotechnical Engineering Bureau assisted by the Information Management Bureau's personnel, established a Local Area Network (LAN) within the Bureau to provide E-Mail among the Bureau Director and Section Heads. The Division Director was also provided with E-Mail access to communicate with the rest of the department. Additional user accounts and databases have been set up on the LAN server allowing up-to-date, single-source access to project memos, and to databases tracking encumbered funds.

LOADTRAC TESTING DEVICE REPORT

The report on the test program to evaluate the consolidation program of the LoadTrac device was completed by the Geotechnical Engineering Bureau assisted by the Transportation Research and Development Bureau.. The results of the program showed the device to produce results comparable to the manual Soil Test machines considered to be the standard against which the Totally Automated Consolidation Test (TACT) was judged originally.

MUD DRILLING TRAINING

In October 1996, the second annual drill school on mud drilling was held in Long Island for Regions 7, 8 and 10. The school was arranged by the Bureau's Subsurface Exploration Section and conducted by Carl Mason, a renowned mud drilling expert. State drill crews have used this knowledge and experience gained on several difficult drilling conditions in flowing sands. The drillers were able to successfully control the hole by using proper mud drilling techniques.

PROCUREMENT CONTRACT

The Geotechnical Engineering Bureau pursued a new method of obtaining subsurface explorations,...procurement contracts. Awareness of the possibility came from working on waterwell contracts. After several months of meetings and investigations, the first procurement drill contract was successfully let in December 1996 for a Region 8 project. The drilling was completed in January 1997, and the entire process took only two months from concept to completion.

TECHNICAL TRAINING

A training program was initiated which consisted of two parts. The first was cross training between the Soil Mechanics Laboratory and General Soils Laboratories for all technicians. The second was a rotation within the General Soils Laboratories where all technicians spent time and became familiar with each section. Both parts went well and will be very beneficial in providing flexibility during heavy work loads.

THE REMODELING OF THE GENERAL SOILS LABORATORY (GSL) SULFATE TESTING AREA

The General Soils Laboratory is now capable of testing a maximum of 190 sets a week (up from a maximum of 115 sets) an increase of approximately 65%. Since the sulfate test takes five consecutive days to perform and is the main component in dealing with turnaround time, the above increase will greatly reduce the testing time for granular material samples. This remodeling was largely due to the efforts of the General Soils Laboratories staff who performed the manual labor required to achieve this task.

GEOTECHNICAL SPECIAL AND STANDARD SPECIFICATIONS

Geotechnical Special and Standard Specifications have been revised and improved. The sheeting, excavation, and cofferdams specifications are either rewritten and in the hands of the Structures Division for issuance or are only a month or two away (in the case of cofferdams). H-pile and lagging and bored-in-pile specifications are already in use. The new flowable fill material specification is in use, and design standards are being prepared to bid it directly against normal granular backfills.

AASHTO/NATIONAL TRANSPORTATION PRODUCT EVALUATION PROGRAM (NTPEP) GEOTEXTILE PROGRAM

During 1996, the work plan for the AASHTO/ NTPEP Geotextile Program was developed and accepted by the NTPEP Oversight Committee; testing agreements worked out with ourselves, Arizona, and Maryland; and the agreements signed with NTPEP. AASHTO has issued the announcement to the manufacturers of the start of the program, and is soliciting submissions. An Interlaboratory Internal Reference Material Program was developed and completed among the three laboratories.

GRANULAR MATERIALS PROCESS REVIEW TASK FORCE (OP-GOAL #96-6)

The efforts of this Task Force has resulted in a revised SCP-13, Geotechnical Control Procedure (GCP-17) with some very forward-thinking changes. Non-project-specific stockpiles, quality assurance sampling, and the controls more concentrated in the geotechnical program area will provide for better quality material at a lower cost and wider availability for fewer construction delays. The first year's trial will start with the printing and issuance of the manual.

II. GOALS

A. 97-98 Goals

One new operational goal has been identified and five carryover goals are listed below. A detailed Goal Statement for each is in the Appendix.

97-1 Development of a Rehabilitated Pavement Design Manual
97-2 Quality Assurance of Drilling Program
97-3 Comparison of Drilling Methods from an Engineering and Cost Benefit Perspective
97-4 Geotechnical Engineering Bureau Program Quality Assurance
97-5 Precast Concrete QC/QA
97-6 Pavement Friction at Intersections *(new goal)*

B. 96-97 Goals

Ten formal operational goals appeared in the Division's 96-97 Operational Plan. The status of these goals follows:

96-1 Hot Mix Asphalt Plant Quality Control/Quality Assurance

This goal, which began in 1991, continues the Department's commitment to change to a performance related specification approach.

Status: Complete. Implementation is on course, Standard Specification Section 402 defines the requirements, work continues with industry to implement the change, a technician training course has been developed with 314 individuals now certified on QC/QA test techniques, and FHWA memorandum of April 15, 1997 formally approved the QC/QA system.

96-2 Precast Concrete QC/QA

This goal will develop and revise acceptance procedures for precast concrete median barriers and drainage units where appropriate for a QC/QA approach.

Status: Behind Schedule. Other work has taken precedence. This goal will continue in 1997.

96-3 Development of a Rehabilitated Pavement Overlay Thickness Design Manual

This goal will develop an overlay design procedure and incorporate it into a manual, also containing refinements to the current pavement evaluation and treatment selection manual.

Status: Behind Schedule. Work progressing, but work in support of ongoing pavement construction has delayed schedule. This goal will continue in 1997.

96-4 Comparison of Drilling Methods from an Engineering and Cost Benefit Perspective

This goal compares different subsurface exploration techniques with the intent to issue guidelines when to use specific drilling techniques.

Status: Behind Schedule. Field study has uncovered another variable to consider, that is the type of drop hammer used for drilling. The goal is being expanded and revised to include the three types of hammers. This goal will continue in 1997.

96-5 Quality Assurance of Drilling Program

This goal will improve the processes for recording field data, and improve communication and information between the drillers and the design engineer customer.

Status: Behind Schedule. Draft Field data worksheet completed. Work delayed due to other work.. This goal will continue in 1997.

96-6 Granular Materials Process Review

This goal reviewed changes to improve the basis of acceptance of granular materials.

Status: Complete. The change has been implemented with the issuance of Geotechnical Control Procedure, GCP-17. Non-project specific granular material stockpiles are a feature improvement in this procedure.

96-7 Geotechnical Engineering Program Quality Assurance

This goal concentrates on customer satisfaction and will provide a menu of services and information on the Geotechnical Engineering Bureau's Programs.

Status: Behind Schedule. A survey, Regional visits, and draft pamphlets have been completed. Other work delays completing project. This goal will continue in 1997.

96-8 Develop the Organization Structure to Implement the Expanded Research Development and Technology Transfer Program

The goal develops operational mechanisms to execute the research program cycle and technology transfer functions.

Status: Complete. The Research Development Council has been created, briefed on their role and the internal organizational structure finalized. A goal completion report documenting the organization is underway and planned to be completed in 1997.

96-9 Laboratory Performance Measures

This goal develops performance measures to use as a tool in managing resources to perform quality assurance testing in the Materials Bureau's Chemical and Physical Laboratories.

Status: Behind Schedule. Other work has delayed evaluation of the pilot performance models. This work will be handled as a lower priority and no longer classified as a goal.

96-10 Materials/Product Stock Lot Basis of Acceptance Review

This goal reviews the materials/products accepted based on stock lot testing. Changes to current procedures will be made based on the review.

Status: Complete. Desired performance categories were developed for sorting and reviewing the materials/products by relative importance. Opportunities for change were found and compiled into a list of action items for consideration.

APPENDIX A - IMPROVEMENT GOAL STATEMENTS

97-1 Development of a Rehabilitated Pavement Design Manual

97-2 Quality Assurance of Drilling Program

97-3 Comparison of Drilling Methods from an Engineering and Cost Benefit Perspective

97-4 Geotechnical Engineering Bureau Program Quality Assurance

97-5 Precast Concrete QC/QA

97-6 Pavement Friction at Intersections *(new goal)*

Technical Services Division
GOAL STATEMENT

Goal Name: #97-1: Development of a Rehabilitated Pavement Design Manual

As Is: This is a continuation of Goal #96-3 which began in 1994. This goal is to improve Volume 1, Pavement Evaluation and Volume ll, Treatment Selection of The Pavement Rehabilitation Manual, prepared by the Materials Bureau and last revised on February 1992 and May 1993, respectively. These procedural manuals evaluate the conditions of existing pavements and utilize this information to form the basis for making decisions on rehabilitation alternatives taking into consideration expected service life and life-cycle cost analyses. Treatment selections are based on limited past experience with traffic volumes up to 35,000 AADT and 5 percent trucks.

Desired State: A rational method of determining pavement overlay thickness treatment selection based on an evaluation of the pavement structural capacity and prediction of future truck traffic over the desired service life.

Team Leader: Don Arcari

Team: Robert Burnett, Rodney Delisle, Gary Douglas, Ron Sines, Bill Snyder, Bill Cuerdon, Wes Yang, Julian Bendaña, Makbul Hossain, Carol Hennessy, Dick Obuchowski, Rick Morgan

Specific Goal for SFY 97-98: Develop a method of designing overlay thicknesses for both rigid and flexible pavements using the AASHTO overlay design procedure or a mechanistic-empirical design procedure. It is expected that the Falling Weight Deflectometer (FWD) will be used to determine the pavement's structural capacity by providing layer moduli, based on deflection data. Produce a final rehabilitation pavement overlay thickness design manual for implementation by December 31, 1998, considering in-situ pavement recycling and improvement opportunities.

Rationale: The quality of decision making concerning the need to rehabilitate or reconstruct our existing pavement systems is highly dependent on our ability to analyze their existing structural capacities and future capacities under different rehabilitation treatments. This design ability, along with prudent life-cycle cost analyses, will form the building blocks for innovative thinking (rational approach) concerning the effects of improved future materials and construction practices in creating higher quality pavement structures.

With a rational and well-calibrated overlay thickness design procedure, engineers can predict service lives more accurately. This will not only result in more accurate project level life-cycle economic analysis, but also more accurate network-level capital programming

Technical Services Division
GOAL STATEMENT

Goal Name: #97-2: Quality Assurance of Drilling Program

As Is: This is a continuation of Goal #96-5. Providing quality Drilling Services to carry out all aspects of the Capital Program has been a major goal of the Geotechnical Engineering Bureau and the Regional Geotechnical Sections for over fifty years. Over the years numerous changes have taken place in drilling technologies and in the manner in which we provide support to the capital program, primarily through obtaining quality subsurface information as represented on the boring log. A number of informal and formal processes are in place which describe how we deliver a quality subsurface drilling log. During work on this goal in 1996, the collection of field data was identified as a critical process. Several Senior Geotechnical engineers have also observed that there is very little interaction between the drillers who provide the "service" and design engineers who are the "customers".

Desired State: There are two distinct objectives for this goal. The first objective is to improve the processes for recording raw field data. The process should be properly documented and a new field log should be created for use in all Statewide explorations. The secondary objective is to develop and implement a field visit process. The process should be designed to communicate the engineering significance for the subsurface exploration program from the perspective of the "customer" (i.e. design engineer) and promote interaction between the driller and the customer.

Team Leader: John Reagan

Team: Phil Walton,Gary Douglas, design engineers representing Roadway Foundations and Structure Foundation Sections, a Regional team consisting of a Regional Geotechnical Engineer and members of the drilling forces, a Bureau Engineer responsible for preparing the boring log process report and a Bureau Engineer to develop and implement the field process review goal.

Specific Goal for SFY 97-98: Develop a new field log form and supporting documentation for use in Statewide explorations. Complete the review of the field visit process done in 1996 and begin implementation of actual field visits.

Rationale: The fundamental building block to creating a quality organization is an in-depth understanding of the processes and procedures for producing the desired end product. The first objective of this goal seeks to improve one of those existing processes and thoroughly document it. The second goal is an action oriented goal designed to reimplement procedures we used to do but just seemed to slip away. The benefits of providing communications between the drillers and engineers should include improved morale and an appreciation for the specific roles of each party, a clearer understanding of what limitations exist when performing subsurface explorations, and a higher quality end product, the boring log.

Technical Services Division
GOAL STATEMENT

Goal Name: #97-3: Comparison of Drilling Methods from an Engineering and Cost Benefit Perspective

As Is: This is a continuation of Goal #96-4. The Subsurface Exploration Section has recently begun an initiative to train Statewide Drill Crews in the concept of mud drilling techniques. A study was conducted in 1996 on the influence of sample quality, when performing traditional casing advancement methods in loose silts and sands under the water table versus mud drilling. During the study it was discovered that the type of hammer system used during drilling is very important. The existing goal is being expanded to study a drop hammer system (our current method), the safety hammer, and the automated hammer system.

Desired State: The objective of this goal is to investigate the influence of various drilling techniques as it relates to the quality of soil samples. The influence of the quality of subsurface information on the design, analysis, and the cost of highway structures will be reviewed. After synthesizing the information, a recommended guide describing what drilling techniques should be applied under given field conditions for specific highway structures will be prepared for the Statewide Drill Crews.

Team Leader: John Reagan

Team:

Drilling Practice and Techniques:	Ron Hoyt Paul Salchert Regional Drillers
Impact on Design and Analysis:	Gary Douglas Phil Walton Tom Carlo
Document Preparation & Support:	Bob Strohmaier Tony Minnitti

Specific Goal for SFY 97-98: The specific goal for the current year is to obtain sufficient field data to compare the different drilling techniques. The field study will require special equipment to monitor the energy delivered by the different hammer systems. Design groups will review the data and evaluate its impact on different design requirements. Recommendations will be made to issue guidelines on where and when to use specific drilling techniques.

Rationale: The design, construction, and long term reliable performance of highway systems is dependent upon a quality subsurface exploration program. This goal will improve our capabilities by studying the influence of different drilling techniques and their impact on designs. By issuing guidelines to assist the Statewide Drill Crews, we will bring improved quality to our subsurface information .

Technical Services Division
GOAL STATEMENT

Goal Name: #97-4: Geotechnical Engineering Program Quality Assurance

As Is: Customer satisfaction with the Geotechnical Program has not been formally collected for some time. Dissatisfaction is usually noted through singular incidents and is treated as such. Our customers are not fully aware of our capabilities and our requirements for delivery of our products. Many of our items and solution techniques are so specialized that EIC's and designers cannot be familiar with all of them. Information on problems does not always get back to our staff.

Desired State: Conduct a formal Customer Satisfaction Survey. Develop a menu of our services. Produce informative pamphlets about our items and techniques as reference material for regional personnel. Write internal "Lessons Learned" memorandums to improve quality.

Team Leader: Bob Burnett

Team: Don Dwyer, Dick Grana, Steve Heiser, Zeke Kyfor, Phil Walton

Specific Goal for SFY 97-98: Send out a paper Satisfaction Survey to all 11 Regions. Meet with them face-to-face to discuss the results. Ferret out problems with policies and procedures and propose solutions. Refine and implement those solutions. Develop a "menu" of Geotechnical Engineering Bureau services. Distribute that menu through the Regional Geotechnical Engineers. Put together a list of topics of items and techniques that we recommend to fix geotechnical problems. Assign those topics to various Bureau experts to be written up in short pamphlets, in a standard format. Distribute those pamphlets via the Regional Geotechnical Engineers to designer or EIC's who have a need for information on that topic. Develop a format for "Lessons Learned" memos and a procedure for producing them.

Rationale: This will formalize the information flow between ourselves and the Regions. It will lead to fewer misunderstandings, better cooperation, and better implementation of our recommendations. It can be done quickly with a minimum of resources. It demonstrates to the Regions our willingness to be open with them and to assist them. It will improve our internal communication and the quality of our products.

Technical Services Division
GOAL STATEMENT

Goal Name: #97-5: Precast Concrete QC/QA

As Is: This is a continuation of Goal #95-11 of the same title. The quality assurance procedures for precast concrete vary between products. Some procedures rely heavily on manufacturer's quality control while others rely mostly on sampling, testing and inspection by Department resident plant inspectors. A new specification, 704-03 Precast Concrete, General, that combines products having similar fabrication requirements was recently implemented. No changes were made to the basis of acceptance for the products.

Desired State: Utilize quality control by the manufacturer and quality assurance by the Department for assuring acceptable quality in precast concrete units to the extent that is reasonable

Team Leader: Robert Awramik

Team: W. Snyder, K. Clements, P. Melas (R1), R. Ziemniak (R4)

Specific Goal for SFY 97-98: Examine the applicability of the QC/QA process to the manufacture of precast concrete products, and develop revised procedures based on end result specifications for precast concrete median barriers and drainage units.

Rationale: The use of precast concrete products by contractors has increased significantly during the past decade and it will continue in the foreseeable future. This increased use has placed a much higher demand for inspectors to cover the manufacturing operations under the standard quality assurance programs. The QC/QA process may be a more effective method for assuring acceptable quality of precast concrete products.

Technical Services Division
GOAL STATEMENT

Goal Name: #97-6: Pavement Friction at Intersections

As Is: No data is available to evaluate the effect of vehicle traffic movements on pavement friction at intersections. Current inventory sites for monitoring pavement friction are typically flat with free-flowing-traffic and located on roadway tangents.

Desired State: Assurance that pavement friction is adequate for hot mix asphalt pavements at roadway intersections.

Team Leader: G. Perregaux

Team: W. Skerritt, O. Picozzi, T. Wohlscheid and J. Bray

Specific Goal for SFY 97-98: By March 31, 1998 prepare a report documenting the pavement friction measurements obtained at intersections with high traffic volumes and hot mix asphalt pavements containing different aggregate rock types. Make recommendations on the next course of action.

Rationale: The object of this goal is to learn: (1) if the frictional characteristics of hot mix asphalt pavement lower significantly at intersections due to vehicle turning movements and changes in acceleration, and (2) if this occurs, the degree to which aggregate rock type in the hot mix asphalt pavements is a determining factor.

TECHNICAL SERVICES DIVISION

MISSION: To provide materials and geotechnical engineering and services and targeted transportation research in a timely and cost effective manner for the Department and other governmental agencies.

This is accomplished through:

- Development and recommendation of engineering policies, standards and specifications.
- Management of a quality assurance program for materials incorporated into Department projects.
- Conduct of specialized transportation studies requiring investigations, testing, analysis and recommendations.

The values we prize:

PEOPLE

TEAMWORK

EXCELLENCE

SERVICE

INTEGRITY

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